UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2002/00692

March 25, 2004

Col. Edward J. Kertis, Jr.
Lieutenant Colonel, Department of the Army, Corps of Engineers
District Commander, Walla Walla District,
201 North Third Avenue
Walla Walla, WA 99362-1867

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fisheries and Conservation Management Act Essential Fish Habitat Consultation on the Effects of the Grande Ronde Stream Restoration Project, Upper Grande Ronde River Subbasin, Union County, Oregon

Dear Colonel Kertis:

Enclosed is a document containing a biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of carrying out the proposed Grande Ronde Stream Restoration Project in the City of La Grande, Oregon. In this Opinion, NOAA Fisheries concludes that the proposed action is not likely to jeopardize the continued existence of ESA-listed Snake River (SR) steelhead (*Oncorhynchus mykiss*) or SR spring/summer chinook salmon (*O. tshawytscha*), nor adversely modify designated critical habitat for SR spring/summer chinook salmon. As required by section 7 of the ESA, NOAA Fisheries includes reasonable and prudent measures with nondiscretionary terms and conditions that NOAA Fisheries believes are necessary to minimize the impact of incidental take associated with this action.

This document also contains a consultation on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and its implementing regulations (50 CFR Part 600). NOAA Fisheries concludes that the proposed action may adversely affect designated EFH for chinook salmon and coho salmon (*O. kisutch*). As required by section 305(b)(4)(A) of the MSA, included are conservation recommendations that NOAA Fisheries believes will avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from the proposed action. As described in the enclosed consultation, 305(b)(4)(B) of the MSA requires that a Federal action agency must provide a detailed response in writing within 30 days of receiving an EFH conservation recommendation.

If you have any questions regarding this letter, please contact Eric Murray of my staff in the Oregon State Habitat Office at 541.975.1835, ext. 222.

Sincerely,

for Michael R Crouse

D. Robert Lohn
Regional Administrator

cc: Jeff Zakel, ODFW
Gary Miller, USFWS

Endangered Species Act - Section 7 Consultation
Biological Opinion

&

Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Grande Ronde Stream Restoration Project
Upper Grande Ronde River Subbasin,
Union County, Oregon

Agency:	Corps of Engineers
Consultation Conducted By:	NOAA's National Marine Fisheries Service, Northwest Region
Date Issued:	March 25, 2004
Issued by:	for Michael R Crouse _____ D. Robert Lohn Regional Administrator
Refer to:	**2002/00692**

TABLE OF CONTENTS

1. INTRODUCTION

The Endangered Species Act (ESA) of 1973 (16 USC 1531-1544), as amended, establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with NOAA's National Marine Fisheries Service (NOAA Fisheries) and U.S. Fish and Wildlife Service (together "Services"), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitats. This biological opinion (Opinion) is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations 50 CFR 402.

The analysis also fulfills the essential fish habitat (EFH) requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).

The U.S. Army Corps of Engineers, Walla Walla District (COE) proposes to fund and, in part, carry out the Grande Ronde Stream Restoration Project (Project). The purpose of the proposed Project is "to implement structural and nonstructural measures to restore the aquatic ecosystem and meet specific passage, holding, and rearing habitat requirements of three target fish species/stocks." Although not stated in the information received from the COE as a purpose of the Project, the proposed activities will provide grade control within the project area, and permanently stabilize a headcut that threatens the Spruce Street Bridge in the City of La Grande, Oregon.

1.1 Background and Consultation History

On July 24, 2003, NOAA Fisheries received a letter dated May 13, 2002, with attached project information and biological assessment (BA) from the COE requesting ESA section 7 formal consultation with a determination for the proposed Project of "may affect, likely to adversely affect" (LAA) Snake River (SR) steelhead (*Oncorhynchus mykiss*), and SR spring/summer chinook (*O. tshawytscha*) salmon. Upon review of the request, NOAA Fisheries' staff contacted the COE with a request for additional information on December 11, 2002. On September 4, 2003, NOAA Fisheries received a response letter from the COE that addressed the additional information requested. At this time formal consultation was initiated.

Accompanying the additional information received on September 4, 2004, was a copy of an agreement between the COE and the local Project partner (the Union Soil and Water Conservation District). This agreement specifies that the local Project partner will be responsible for the cost of any and all repairs that may occur to the Project structures, including

damage resulting from flood events. The COE has committed to programing contingency funds into the Project budget to remedy stream channel sealing problems that may occur as a result of the Project's implementation.

Several conversations about elements of the proposed project occurred between the COE and NOAA Fisheries during December 2003. These discussions focused on the potential for stream flow to go subsurface through the project area during the summer following project completion. There was concern that adult Snake River (SR) chinook salmon could become trapped in or below the project area if this occurred. SR chinook salmon numbers in the Upper Grande Ronde River subbasin are low, and further significant reduction of successful adult spawners may reduce the chances for recovery of this species in the subbasin.[1]

As originally designed, the Project included structural elements that would ensure that an irrigation ditch near the headcut would be able to intercept an allocated water right of approximately 50.98 cubic feet per second (cfs) of water. Grande Ronde River stream flows in the action area are often less than 50 cfs during summer. The BA states that summer flows in the Project area are typically 17 cfs. NOAA Fisheries was concerned that the proposed action of placing large amounts of coarse material in the stream to regrade the stream channel in the headcut area combined with this water diversion, could cause stream flow to go subsurface in the Project area during summer. This could lead to stranding of adult SR chinook salmon below the Project area, cutting them off from their spawning areas upstream.

In response to these concerns, the COE and local Project partners decided to remove the Project elements related to the irrigation ditch and diversion. The future use of this diversion is unknown at this time, as it has not been used in several years and the water right may be vacated in the future.

On January 9, 2004, the COE provided NOAA Fisheries with a letter and BA amendment stating that the Project elements related to the irrigation diversion would no longer be part of the Project. On January 13, 2004, NOAA Fisheries sent a letter to the COE requesting an 60 day extension to the complete the consultation on this Project. The administrative record for this consultation is on file at the Oregon State Habitat Office.

1.2 Proposed Action

The COE proposes to install a series of eight rock weirs made of boulders arranged in an upstream "V" arrangement for grade control, and a concrete weir at the upstream end of the project area to stabilize the existing headcut. The COE also proposes to install seven cross-vane/grade control structures, nine J-hook structures, 18 rock vane structures, 67 bank protection units, channel and floodplain reshaping, 2,400 feet of bank revetments, 750 feet of bank lay-back, and revegetation. Although the headcut arrest is the major focus of this Project, a "habitat

[1] See section 2.1.1 of this Document

restoration area" below the headcut arrest will also be improved by placing instream structures and reshaping streambanks.

Rock Weirs

Large diameter boulders will be place within the Grande Ronde River in a "V" shape that will point upstream. The boulders in the center of the "V" will be lower in elevation to facilitate the training of the stream's thalweg into the center of the channel. Seven of the eight weirs will be spaced 60 feet apart and the most downstream "V" will be spaced 100 feet apart in the uppermost "grade control" portion of the project area. Each consecutive weir will be one foot lower in elevation as they progress downstream. Eighteen additional rock weirs will be installed in the downstream "habitat restoration section" of the project area.

The weirs will be installed using a tracked excavator. The excavator will dig a trench to accommodate the boulders. The structure will span the width of the channel. The "limbs" of the structures will be keyed into the banks and footer rocks will be placed below the boulders to discourage undercutting of the structure. The limbs will extend at a 20 to 30° upstream angle from the bank to the center of the "V", and the rocks will slope at 10 to 15° angle down from the outside down to the center of the "V" which will be at streambed elevation. The center of the "V" will be perpendicular to the thalweg of the stream.

Since the cobble in this reach of the Grande Ronde is large and summer flows are low, there is a slight chance that stream flows could go entirely subgrade in the first two summers after the installation of these structures. To lessen the chance of flows becoming subsurface, the COE will add rock fill below the cross vanes at depths varying from one to nine feet. The rock will be placed in a maximum of 4-foot lifts. Sand will be added into the voids and one foot of cobble will be added over the sand and fill. A straw mat will be added one foot below the channel surface, and any voids will be filled with sand. Finally, if flows still go subsurface anywhere throughout the 600-foot headcut section, sand will be placed by hand in voids that leak surface water from the channel. The COE has determined that the channel should seal itself within two spring runoff cycles. The rock weirs are designed to withstand a 50-year flood event.

Concrete Grade Control Structure

The concrete structure will be installed at the top of the headcut area, and is a fail-safe in case of rock weir failure. The concrete weir will be buried. The top of the weir will be flush with the streambed. The downstream side of the weir will have reinforced blocks and a slab designed to dissipate energy and resist undercutting. The downstream side of the structure will only be exposed if the rock weir structures had failed. The concrete structure is designed to withstand a 100-year flood event. Installation of the concrete structure will require excavation in the stream channel, and pouring concrete into forms for the structure.

Rock Vanes

These structures are similar to the rock weirs in shape and construction. The major difference is that they will be approximately 1/3 of the length of the rock weirs. Eighteen of these structures

will be installed in the downstream reaches of the project area to stabilize the channel and streambanks, train the thalweg of the stream, and dissipate fluvial energy.

J-Hooks

The J-hook structures are describe as being one leg of the rock vane structure with a sill perpendicular to stream flows. The structure is designed to reduce shear along streambanks, train the thalweg of the stream, increase channel roughness, relieve back eddy erosion of streambanks, and control the stream grade. Construction of these structures will be similar to previously described construction activities.

Bank Protection and Revetment Units

Boulders, logs, and rootwads will be used to armor streambanks and prevent streambank erosion. The proposed bank protection units will be anchored to the streambank. Installation will require excavation of the streambank and streambed for installation of these structures. Sixty-seven of these structures are proposed as a part of this Project.

Bankfull Channel Reshaping

The newly-defined stream channel will be aligned with the new thalweg defined by the installed instream structures. The channel will be designed to carry the normal bankfull discharge of 2,800 cfs at a velocity of 6 feet per second. The channel will be approximately 90 feet across, and 3 to 4 feet deep. Along with a new thalweg, the COE proposes to create a new floodplain terrace with excavated materials.

Bank Lay-Back

The Project's design calls for increasing the channel cross-section by removing areas where down cutting has resulted in near vertical streambanks. This will require removing an estimated 3,200 cubic yards of soil. The newly-created streambanks would then be revegetated with riparian sedges, grasses, shrubs, and trees.

Revegetation

Disturbed areas will be revegetated with a combination of sedges, grasses, riparian hardwoods, and coniferous trees. This will be done by the COE, and local volunteer and school groups that will collect, culture, and plant local riparian vegetation within the project area. The planting will occur in the fall. The Union County Soil and Water Conservation District has agreed to water the project area at approximately 1 inch per month, between the months of June and September for two years after the completion of the project.

Additional Activities

The construction of instream structures and bank and channel alteration will require heavy equipment in or near the stream channel. Any of the following types of equipment may be used to accomplish construction: Tracked excavators, rubber-tired backhoes/loaders, bull-dozers, and dump trucks.

To facilitate the installation of instream structures, coffer dams may be installed on an as-needed basis. In the event that ESA-listed fish are in the Project area, the COE will employ the Oregon Department of Fish and Wildlife (ODFW) to remove fish from the construction area to a reach of the Grande Ronde River a minimum of 1 mile upstream.

The irrigation ditch beside the proposed concrete structure may be used to temporarily divert water around the work area.

Proposed Conservation Measures

- The COE will obtain all relevant permits and authorizations for this activity.

- Block nets with a maximum 3/8-inch mesh will be installed upstream and downstream of the project area. This will preclude ESA-listed fish from entering the work area during construction. The nets will be installed in areas where stream velocity does not exceed 0.4 feet per second. These nets will be tended during daylight hours while in place.

- All instream work will be accomplished during the work window for this reach of the Grande Ronde River of July 1 to October 15 .

- During times of active in-water construction, stream turbidity will be monitored and recorded. Monitoring sites will be established at an undisturbed location 100 feet upstream of the active work site and 100 feet downstream of the active work site. The turbidity downstream will be monitored at 4-hour intervals, turbidity at the downstream station will not be greater than 110% of the turbidity of the upstream station. The COE proposes that this standard can be exceeded for a maximum of one 4-hour interval per 24 hour work period provided that all practicable turbidity control measures have been implemented.

- Any fish trapped or entrained or otherwise threatened by construction will be captured and transported by ODFW to the previously mentioned release site.

- Erosion/turbidity control measures may include any of the following: Filter bags, sediment fences, sediment traps or catch basins, silt curtains, straw bales, or berms.

- Work will be accomplished in a manner that will minimize riparian vegetation disturbance.

- Flowing water will be diverted around wet concrete and standing water that comes into contact with wet concrete will be removed to an upland site by pumping or other method.

- Equipment and or possible chemical contaminants will be staged and stored in a bermed and lined staging area. Any leaking of fuel, lubricants, or hydraulic fluid will result in the immediate cessation of work.

- COE and/or ODFW will be on-site at all times during constructions to assure compliance with all regulations and permit conditions.

Proposed Monitoring
The COE will conduct annual meetings for three years after the completion of the project to evaluate the success of the project, habitat trends identified through monitoring, identify needs for additional monitoring, and assess whether reinitiating consultation is necessary. All monitoring data gathered or provided to the COE will be forwarded to NOAA Fisheries and other stakeholder agencies.

- The COE has completed a pre-project topographic survey. Within three years of completing the project, the COE will conduct another topographic survey to assess the effectiveness of the Project in accomplishing grade control.

- ODFW will conduct visual surveys to assess the ability of ESA-listed adult and juvenile fish to pass the project area and the condition of the habitat in the project area. ODFW will provide a narrative report to the COE that will be forwarded to NOAA Fisheries and others.

- Permanent photo points will be established to assess riparian vegetation recovery.

- The Project sponsor will visually inspect all structures to determine whether they are functioning as intended and have withstood high flow events. If any structures are not properly functioning or have been damaged, repairs will be planned.

2. ENDANGERED SPECIES ACT

2.1 Biological Opinion

2.1.1 Biological Information

SR Steelhead
The SR steelhead evolutionarily significant unit (ESU) was listed as threatened on August 18, 1997 (62 FR43937). SR spring/summer chinook salmon ESU was listed as threatened on April 22, 1992 (57 FR 14653). Protective regulations for SR steelhead were issued under section 4(d) of the ESA on July 10, 2000 (65 FR 42422). Biological information for SR steelhead is found in Busby *et al.* (1996). Recent counts of upstream migration at Lower Granite Dam, show at least some short-term improvement in the levels of adults returning to spawn. The Grande Ronde River is one of the principal basins in the Snake River drainage contributing to salmon and steelhead production. Interim abundance targets for SR steelhead are found in Table 1.

Table 1. Interim abundance targets for Snake River steelhead in the Grande Ronde River spawning aggregation (Adapted from NOAA 2003).

ESU/Spawning Aggregations*	Interim Abundance Targets	Interim Productivity Objectives
Snake River Steelhead ESU		Snake River ESU steelhead populations are currently well below recovery levels. The geometric mean Natural Replacement Rate (NRR) will therefore need to be greater than 1.0.
Grande Ronde		
Lower Grande Ronde	2600	
Joseph Creek	1400	
Middle Fork	2000	
Upper Mainstem	4000	
Imnaha	2700	

*Population in bold is addressed in this Opinion

The SR steelhead ESU contains portions of southeastern Washington, northeastern Oregon, and north-central Idaho. The environmental conditions within this ESU are generally drier and warmer than in other steelhead ESUs. The SR steelhead run is considered a summer run based on adult upstream migration. The adults enter the Columbia River in the summer migrating upriver until they spawn in the spring between March and May. Runs found in the Grande Ronde system are generally A-run fish, or fish that have spent one year in the ocean.

There are very few annual estimates of steelhead returns throughout the Snake River Basin. Returns over the Lower Granite Dam were low during the 1990s, however, run estimates in the Grande Ronde and Imnaha improved since the 1990s (NOAA 2003). The long-term population trends have remained negative, while the short-term population trends for the ESU have improved in comparison to the time frame analyzed in the last status review (NOAA 2003). The median long-term population growth rate (λ) is 0.998, based on the assumption that only natural-origin spawners are returned from wild stock (NOAA 2003). The short-term λ, based on the same assumption, is 1.013 (NOAA 2003). Assuming that both hatchery and wild fish contribute to the natural production in proportion to their numbers, the long-term λ is 0.733 and short-term λ is 0.753 (NOAA 2003). In spite of the recent increases in numbers, the majority of populations in the ESU with abundance data are still well below the interim abundance targets (Table 1).

Important features of the adult spawning, juvenile rearing, and adult and migratory habitat for this species are: Substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food (juvenile only), riparian vegetation, space, and safe passage conditions. (Bjornn and Reiser, 1991; NOAA Fisheries, 1996b; Spence *et al.*, 1996). The habitat features that the proposed project may affect are: Substrate, water quality, water temperature, water velocity, cover/shelter, food, and riparian vegetation.

Snake River Spring/Summer Chinook

SR spring/summer chinook enter the Columbia River in late February and early March in high elevation areas. The fish hold in the cooler deep pools until the late summer and early fall when they return to their native streams and begin spawning. The eggs incubate through the fall and winter and emergence begins in the early winter and late spring. Juvenile SR spring/summer chinook exhibit a stream type life history. The fish will rear for one year in fresh water before they migrate out to the ocean in the spring of their second year. The fish generally return from the ocean after two or three years. Interim abundance targets for SR chinook salmon are provided in Table 2.

Table 2. Interim abundance and productivity targets for SR spring/summer chinook in Oregon (adapted from NOAA 2003).

ESU/Spawning Aggregations*	Interim Abundance Target	Interim Productivity Target
Snake River Spring/Summer Chinook		"For delisting to be considered, the 8-year (approximately two generation) geometric mean cohort replacement rate of a listed species must exceed 1.0 during the eight years before delisting. For spring/summer chinook salmon, this goal must be met for 80% of the index areas available for natural cohort replacement rate estimation." (Proposed Snake River Recovery Plan; NMFS 1995)
Grande Ronde River	2000	
Imnaha	2500	

*Population in bold is addressed in this Opinion

There are several factors for the decline of SR spring/summer chinook salmon. Habitat loss from hydroelectric development, habitat degradation from land use activities, and impacts from hatcheries are all responsible for the decline of the stocks. Recent abundance for the ESU has increased. The geometric mean return of naturally-reproducing spawners from 1997 to 2001, was 3,700, which is well below the interim abundance targets for the ESU. The 2001 run was estimated to be 17,000 naturally-reproducing spawners (NOAA 2003). The short-term and long-term productivity estimates (λ) are still well below the interim productivity target for the ESU (Table 2). The Grande Ronde and Imnaha Rivers had the greatest increase in λ for the short term. ODFW estimates the number of adult SR chinook spawners in the Upper Grande Ronde River for 2003 to be approximately 290 fish (Keniry 2003). The BA states that within the

Grande Ronde River subbasin, riparian and instream habitat degradation have severely affected SR spring/summer chinook salmon production potential.

2.1.2 Evaluating the Proposed Action

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402 (the consultation regulations). In conducting analyses of habitat-altering actions under section 7 of the ESA, NOAA Fisheries uses the following steps: (1) Consider the status and biological requirements of the species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species; (4) consider cumulative effects; and (5) determine whether the proposed action, in light of the above factors, is likely to appreciably reduce the likelihood of species survival in the wild or adversely modify its critical habitat. In completing this step of the analysis, NOAA Fisheries determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the continued existence of the ESA-listed species or result in adverse modification of designated critical habitat, or both. If NOAA Fisheries finds that the action is likely to jeopardize the ESA-listed species, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

NOAA Fisheries has developed guidelines for basin-level, multispecies recovery planning on which individual, species-specific recovery plans can be founded. "Basin-level" encompasses habitat, harvest, hatcheries, and hydro. The recovery planning analysis is contained in the document entitled "*Conservation of Columbia Basin Fish: Final Basinwide Salmon Recovery Strategy*" (hereafter, the Basinwide Recovery Strategy [Federal Caucus 2000]) which will be used to guide recovery planing for SR steelhead and SR spring/summer chinook salmon.

The Basinwide Recovery Strategy calls for restoration of degraded habitats to produce significant measurable benefits for listed anadromous and resident fish. Immediate and long-term priorities for restoration measures relevant to this consultation include the following general habitat improvements for tributary reaches:

- Restoring tributary flows.
- Addressing passage obstructions.
- Protecting currently productive habitat.
- Increasing the amount of habitat.
- Improving water quality.

2.1.3 Biological Requirements

The first step NOAA Fisheries uses when applying ESA section 7(a)(2) to the listed ESUs considered in this Opinion is to define the species' biological requirements within the action area. Biological requirements are population characteristics necessary for the listed ESUs to survive and recover to naturally-reproducing population sizes, at which time protection under the ESA would become unnecessary. The listed species' biological requirements may be described

as characteristics of the habitat, population or both (McElhany *et al.* 2000). Interim abundance targets for the SR steelhead and SR spring /summer chinook are represented in Table 1 and 2.

The Projects will occur within designated critical habitat for the SR chinook salmon ESU. Freshwater critical habitat can include all waterways, substrates, and adjacent riparian areas below longstanding, natural impassable barriers (*i.e.*, natural waterfalls in existence for at least several hundred years) and dams that block access to former habitat.

Essential features of critical habitat for the listed species are: (1) Substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food (juvenile only), (8) riparian vegetation, (9) space, and (10) safe passage conditions. For this consultation, the essential features that function to support successful adult and juvenile migration, adult holding, spawning, incubation, rearing, and growth and development to adulthood include substrate, water quality, water temperature, cover/shelter, and riparian vegetation. All of these essential features of critical habitat are included in the MPI (NOAA Fisheries 1996).

2.1.4 Environmental Baseline

The environmental baseline is an analysis of the effects of past and ongoing human-caused and natural factors leading to the current status of the species or its habitat and ecosystem within the action area. The "action area" is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). The action area for this consultation extends from the Spruce Street Bridge in La Grande, Oregon, to the furthest extent of the turbidity plume, up to 2 miles downstream from the Project area.

In general, the environment for listed species in the Columbia River Basin (CRB), including those that migrate past or spawn upstream from the action area, has been dramatically affected by the development and operation of the Federal Columbia River Power System (FCRPS). Storage dams have eliminated mainstem spawning and rearing habitat, and have altered the natural flow regime of the Snake and Columbia Rivers, decreasing spring and summer flows, increasing fall and winter flow, and altering natural thermal patterns. Power operations cause fluctuation in flow levels and river elevations, affecting fish movement through reservoirs, disturbing riparian areas and possibly stranding fish in shallow areas as flows recede. The four dams in the migration corridor of the Columbia River kill or injure a portion of the smolts passing through the area. The low velocity movement of water through the reservoirs behind the dams slows the smolts' journey to the ocean and enhances the survival of predatory fish (Independent Scientific Group 1996, National Research Council 1996). Formerly complex mainstem habitats in the Columbia, Snake, and Willamette Rivers have been reduced, for the most part, to single channels, with floodplains reduced in size, and off-channel habitats eliminated or disconnected from the main channel (Sedell and Froggatt 1984; Independent Scientific Group 1996; and Coutant 1999). The amount of large woody debris in these rivers has declined, reducing habitat complexity and altering the rivers' food webs (Maser and Sedell 1994).

Other human activities that have degraded aquatic habitats or affected native fish populations in the CRB include stream channelization, elimination of wetlands, construction of flood control dams and levees, construction of roads (many with impassable culverts), timber harvest, splash dams, mining, water withdrawals, unscreened water diversions, agriculture, livestock grazing, urbanization, outdoor recreation, fire exclusion/suppression, artificial fish propagation, fish harvest, and introduction of non-native species (Henjum *et al.* 1994; Rhodes *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; and Lee *et al.* 1997). In many watersheds, land management and development activities have: (1) Reduced connectivity (*i.e.*, the flow of energy, organisms, and materials) between streams, riparian areas, floodplains, and uplands; (2) elevated fine sediment yields, degrading spawning and rearing habitat; (3) reduced large woody material that traps sediment, stabilizes streambanks, and helps form pools; (4) reduced vegetative canopy that minimizes solar heating of streams; (5) caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations; (6) altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior; and (7) altered floodplain function, water tables and base flows (Henjum *et al.* 1994; McIntosh *et al.* 1994; Rhodes *et al.* 1994; Wissmar *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; and Lee *et al.* 1997).

To address problems inhibiting salmonid recovery in CRB tributaries, the Federal resource and land management agencies developed the *All H Strategy* (Federal Caucus 2000). Components of the *All H Strategy* commit these agencies to protecting and restoring habitat.

Environmental baseline conditions within the action area were evaluated for the subject actions at the watershed scale. The results of this evaluation, based on the "matrix of pathways and indicators" (MPI) described in *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (NOAA Fisheries 1996), follow. This method assesses the current condition of instream, riparian, and watershed factors that collectively provide properly functioning aquatic habitat essential for the survival and recovery of the species.

The COE rated three habitat indicators in the *Matrix of Pathways and Indicators* (MPI) were rated as "properly functioning" and include: Change in peak/base flow, chemical contaminants/nutrients, and physical barriers. Three habitat indicators were rated as "functioning at risk" and include: Streambank condition, drainage network increase, and road density/location. The remaining indicators were rated as "not properly functioning" and include: Temperature, sediment/substrate, substrate embeddedness, large woody debris, pool frequency, pool quality, off-channel habitat/refugia, width/depth ratios, floodplain connectivity, riparian conservation areas, and disturbance regime.

NOAA Fisheries believes that the COE's ratings are generally correct, but other information indicates that some habitat indicators may be rated too high. For instance, change in peak/base flow was rated as functioning appropriately, however irrigation withdrawals during the summer have reduced base flows considerably. The BA identifies several large diversions above the Project area that remove a considerable quantity of water during the irrigation season. Heavy

historic timber harvest in the upper watersheds of the subbasin in combination with increased drainage network due to road building, and channelization of some stream reaches has resulted in increases in peak flows and more frequent floods (Wissmar *et al.* 1994, Forest Service 2004). The Forest Service BA for the Upper Grande Ronde River subbasin rates approximately half (29 of 64) of the subwatersheds in the subbasin as "not properly functioning." Additionally, "physical barriers" was rated by the COE as "functioning appropriately," however, the headcut that is to be repaired by the proposed project can present a passage barrier to fish at certain flows.

The Upper Grande Ronde River subbasin is a highly disturbed riverine system degraded by past and present timber harvest, mining, livestock grazing, flood control, and withdrawal of water for irrigation (Wissmar *et al.* 1994, McIntosh *et al.* 1994, Forest Service 2004). The Grande Ronde River in the Project area has been channelized for flood control. This channelization is most likely a contributing factor in the development of the headcut this Project is designed to fix.

2.1.5 Effects of the Proposed Action

Effects of the action are defined as: "The direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR 402.02). Direct effects occur at the Project site and may extend upstream or downstream based on the potential for impairing the value of habitat for meeting the species' biological requirements. Indirect effects are defined in 50 CFR 402.02 as "those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." They include the effects on listed species or habitat of future activities that are induced by the proposed action and that occur after the action is completed. "Interrelated actions are those that are part of a larger action and depend on the larger action for their justification" (50 CFR 402.02). "Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR 402.02).

In jeopardy analysis, NOAA Fisheries evaluates the effects of proposed actions on listed species and seeks to answer the question of whether the species can be expected to survive with an adequate potential for recovery.

<u>Activities Involving In-water Work</u>
The COE has determined that the proposed Project is LAA SR steelhead and SR spring/summer chinook. Activities involving in-water and near-water construction will cause short-term adverse habitat effects and potentially result in harassment or harm of SR steelhead juveniles and, potentially, SR chinook salmon adults. In most years, water temperatures in the Grande Ronde River in the Project area are too high to be suitable for juvenile salmonids. However, stream temperatures are dependant on ambient air temperature, stream flow, and snow pack remaining in headwater areas. It is likely that at least a few juvenile SR steelhead and adult SR chinook salmon will be present during construction activities.

The construction activities proposed as part of this project will require instream operation of heavy machinery and exposure of large areas of bare soil. This will produce sediment plumes sufficient to cause harm and harassment of any list anadromous salmonids present during construction activities and possibly during subsequent high flow events. Potential effects include mortality from exposure to suspended sediments (turbidity) or contaminants, and behavioral changes resulting from elevated turbidity level (Sigler *et al.* 1984, Berg and Northcote 1985, Whitman *et al.* 1982, Gregory 1998), during in-water construction.

Suspended sediment and turbidity influences on fish reported in the literature range from beneficial to detrimental. Elevated total suspended solids (TSS) conditions have been reported to enhance cover conditions, reduce piscivorus fish/bird predation rates, and improve survival. Elevated TSS conditions have also been reported to cause physiological stress, reduce growth, and adversely affect survival. Of key importance in considering the detrimental effects of TSS on fish are the frequency and the duration of the exposure, not just the TSS concentration.

Behavioral avoidance of turbid waters may be one of the most important effects of suspended sediments (DeVore *et al.* 1980, Birtwell *et al.* 1984, Scannell 1988). Salmonids have been observed to move laterally and downstream to avoid turbid plumes (McLeay *et al.* 1984, 1987, Sigler *et al.* 1984, Lloyd 1987, Scannell 1988, Servizi and Martens 1991). Juvenile salmonids tend to avoid streams that are chronically turbid, such as glacial streams or those disturbed by human activities, unless the fish need to traverse these streams along migration routes (Lloyd *et al.* 1987). In addition, a potentially positive reported effect is providing refuge and cover from predation (Gregory and Levings 1988).

Fish that remain in turbid, or elevated TSS, waters experience a reduction in predation from piscivorus fish and birds (Gregory and Levings 1998). In systems with intense predation pressure, this provides a beneficial trade off (*e.g.*, enhanced survival) to the cost of potential physical effects (*e.g.*, reduced growth). Turbidity levels of about 23 Nephalometric Turbidity Units (NTU) have been found to minimize bird and fish predation risks (Gregory 1993). Exposure duration is a critical determinant of the occurrence and importance of physical or behavioral effects (Newcombe and MacDonald 1991). Salmonids have evolved in systems that periodically experience short-term pulses (days to weeks) of high suspended sediment loads, often associated with flood events, and are adapted to such high pulse exposures. Adult and larger juvenile salmonids may be little affected by the high concentrations of suspended sediments that occur during storm and snowmelt runoff episodes (Bjornn and Reiser 1991). However, research shows that chronic exposure can cause physiological stress responses that can increase maintenance energy and reduce feeding and growth (Redding *et al.* 1987, Lloyd 1987, Servizi and Martens 1991).

Turbidity, at moderate levels, has the potential to adversely affect primary and secondary productivity, and at high levels, has the potential to injure and kill adult and juvenile fish, and may also interfere with feeding (Spence *et al.* 1996). Newly-emerged salmonid fry may be vulnerable to even moderate amounts of turbidity (Bjornn and Reiser 1991). Other behavioral effects on fish, such as gill flaring and feeding changes, have been observed in response to pulses

of suspended sediment (Berg and Northcote 1985). Fine, redeposited sediments also have the potential to adversely affect primary and secondary productivity (Spence *et al.* 1996), and to reduce incubation success (Bell 1991) and cover for juvenile salmonids (Bjornn and Reiser 1991).

Increased sedimentation may lead to increased embeddness of spawning substrates downstream of the project. Instream work scheduled for these projects will take place during the in-water window for the area (July 1 to October 31). Due to the typically low flows present in the individual project areas during this time, sedimentation rates are expected to be minimal. However, due to the large scale of each years proposed activities and the large area of bare soil to be exposed, some sedimentation of substrates of downstream reaches will occur. Disturbance of riparian vegetation will result from operation of heavy machinery near the stream and could lead to decreased shade, increased water temperatures, and decreased streambank stability until riparian vegetation is re-established.

There is the potential for fuel or other contaminant spills associated with use of heavy equipment in or near the stream. Operation of the back-hoes, excavators, and other equipment requires the use of fuel, lubricants, *etc.*, which, if spilled into the channel of a waterbody or into the adjacent riparian zone, can injure or kill aquatic organisms. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain poly-cyclic aromatic hydrocarbons (PAHs), which can be acutely toxic to salmonids at high levels of exposure and can also cause chronic lethal and acute and chronic sublethal effects to aquatic organisms (Neff 1985). Because the potential for chemical contamination should be localized and brief, the probability of direct mortality is negligible. In-water work timing during the preferred in-water work timing period of July 1 through October 1, will minimize the risk from chemical contamination during in-water work activities.

Habitat Effects of Channel Realignment and Instream Structures

The proposed project will result in some improvements to SR steelhead and SR chinook salmon habitat by increasing habitat complexity and in the long term, improving fish passage.

Although the above mentioned effects will result in improvements to SR steelhead and SR chinook salmon habitat, NOAA Fisheries is concerned that if the instream structures fail during high flow events, several negative effects to SR steelhead and SR chinook salmon and their habitat both in and downstream of the project sites may occur.

Durability of placed instream structures varies, but a study by Roper *et al.* (1998) found that less than 20% of instream structures placed in a wide variety of stream sizes and locations failed during flood events. This study found that stream order affected durability, with structures placed in higher order streams having a greater probability of failure. The Grande Ronde River, in the Project area, is a 5^{th}- 6^{th} order stream and displays a "flashy" hydrograph, typified by very high flows during snowmelt in the spring and early summer, and low base flows during late summer and fall. Disturbances such as logging and channelization in the waterhsed above the

Project area have led to increases in peak flows. The probability of failure of instream structures in generally higher in these types of systems as opposed to lower order, less "flashy" systems.

Projects similar to the proposed Project have been implemented in northeastern Oregon during the past few years. Most of these projects have occurred in small, low order streams. Some of these projects such as the McCoy Meadows Project (NOAA Fisheries No.: 2002/00177)[2] have been successful so far, while others, such as the East Birch Creek Rehabilitation Project (NOAA Fisheries Nos.: 2001/00778 and 2002/01181)[3] have required substantial follow-up work to correct design flaws.

NOAA Fisheries is concerned that the cost of repairing Projects elements damaged by future flood events may be substantial. Although the local Project sponsor has committed to paying for repairs. Potential negative effects to SR steelhead and SR chinook salmon and their habitats from failure of either the newly-constructed instream structures could include sedimentation of downstream stream reaches and/or the creation fish passage barriers.

A situation such as this occurred with the Nursery Bride Fish ladder in Milton-Freewater, Oregon (NOAA Fisheries No. 2003/00593).[4] The construction of this fish ladder was a cost share project between the COE and a local partner. After millions of dollars were spent to construct this fish passage structure, failures in design of the structure caused it to fill with debris and become a fish passage barrier. Considerable amounts of money are now required to maintain this structure. During the time that funding sources were being sought, ESA-listed salmonids were unable to pass through the ladder to reach their spawning areas.

The best information available indicates that aggressive restoration project design such as that proposed in the subject Project are prone to many problems that can be very harmful if not quickly corrected. Some of the Project elements may fail during future high flow events. Most of the structures in this Project have been designed to withstand 50- or 100-year flow events. In 1996, an estimated 500-year flow event in the Grande Ronde River caused widespread flood damage. As described in section 2.1.4 of this Opinion, past management activities in the Upper Grande Ronde subbasin have led to high magnitude peak flow events. In general, the proposed Project will provide more channel stability.

There is also a possibility that, due to the large amount of coarse material to be placed in the stream channel and the low summer stream flows in the Grande Ronde River, that stream flows in the Project area may go subsurface during the late spring or summer of the two years following Project implementation. If this occurs, a passage barrier for adult SR spring/ summer

---

[2] Available at: http://www.nwr.noaa.gov/1publcat/bo/2002/200200177_mccoy_meadows_07-17-2002.pdf

[3] Available at: http://www.nwr.noaa.gov/1publcat/bo/2001/osb2001-0026-fec.pdf

[4] Biological Opinion available at: http://www.nwr.noaa.gov/1publcat/bo/2003/200300593_nursery_Y2006_12-05-2003.pdf

chinook salmon could result. The COE's proposed conservation measures to avoid this should minimizae the chance of it occurring.

SR spring/summer chinook salmon typically migrate through the Project area in May, June, and as late as July in some years.[5] The BA states that peak SR spring/summer chinook salmon migration through the Project area occurs in June. There is a risk that, in the two years following Project implementation, some adult chinook salmon could become stranded below the Project area. These fish might not be able to reach their spawning areas and would most likely die as water temperatures increased throughout the summer.

Fish Salvage

Direct effects to juvenile SR steelhead and juvenile or adult SR chinook salmon will occur in the form of harm or harassment if a fish salvage operation is necessary to move them from the action area. Fish biologists from the ODFW will move stranded anadromous salmonids from the instream isolation area by seining or electroshocking, which will cause stress to these fish. Stress approaching or exceeding the physiological tolerance limits of individual fish can impair reproductive success, growth, resistance to infectious diseases, and general survival (Wedemeyer *et al.* 1990). Many factors influence the relative effects of electrofishing on fish including conductivity of water, depth of water, substrate, and size of the fish. Additionally, the amount of time taken to complete electrofishing within the sample area, the frequency of sampling through time, crew efficiency, and operator skill have been identified as factors influencing the magnitude of electrofishing effects. Mechanical injury is also possible during netting, holding, or transporting.

The small number of juvenile SR steelhead that may be affected by the fish salvage operation will not have population level effects. Most adult SR chinook salmon pass through the Project area in May and June, but there is a chance that some fish will be passing through the Project area as late as July. Adult SR chinook salmon in the Project area are already under a great deal of stress at this time due to the high water temperatures. Any handling of these fish could result in mortality.

2.1.6 Cumulative Effects

"Cumulative effects" are defined in 50 CFR 402.02 as those effects of "future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation."

While the BA provided by the COE does not specifically identify any cumulative effects, information provided by other Federal agencies indicate the following cumulative effects are likely to occur in the action area.

[5] Telephone Conversation with Pat Keniry, ODFW, (January 14, 2004) regrading timing of fish migration through the Project area.

Private timber harvests in Oregon are regulated by the Oregon Forest Practices Act. These regulations for private timber harvest and road building are less restrictive than those on National Forests. Timber harvest on private lands in the Upper Grande Ronde subbasin has generally increased in recent years. BAs from the Forest Service describes the adverse cumulative effects from proposed private timber harvests as high. This BA states, "The lack of complete regulations and enforcement of existing regulations on private land timber harvests increases the likelihood of cumulative adverse effects" (Forest Service 2004).

Water withdrawal for irrigation and livestock grazing are likely to occur at present levels for the foreseeable future. Between 1990 and 2000, the population of Union County increased by 3.9%.[6] Thus, NOAA Fisheries assumes that future private and state actions will continue within the action area, but at increasingly higher levels as population density climbs. Most future actions by the state of Oregon are described in the Oregon Plan for Salmon and Watershed measures, which includes a variety of programs designed to benefit salmon and watershed health.

2.1.7 Conclusion

NOAA Fisheries has determined that, when the effects of the subject action addressed in this Opinion are added to the environmental baseline and cumulative effects occurring in the action area, they are not likely to jeopardize the continued existence of SR steelhead nor SR spring/summer chinook salmon. The Project will also not result in adverse modification of designated critical habitat for SR chinook salmon.

NOAA Fisheries believes that the proposed action will cause some minor, short-term increases in stream turbidity and sedimentation rates in the action area. It is also possible that some mortality of juvenile SR steelhead and adult SR spring/summer chinook salmon may result from the instream work and the fish salvage operations. Vegetation disturbance or removal is expected to result in a temporary decrease in shade, as well as some behavior modification in the form of avoidance of areas without sufficient cover. These effects will diminish over time as newly-planted riparian vegetation is established.

NOAA Fisheries' conclusions are based on the following considerations: (1) All instream work will occur during the in-water work window for this area (July 1 - October 31), and instream work will be limited to the amount described in the BA; (2) disturbed areas will be replanted with native vegetation; and (3) a long-term improvement of fish passage in the action area will result from the proposed action. Thus, the proposed action is not expected to impair currently properly functioning habitats, appreciably reduce the functioning of already impaired habitats,

[6] U.S. Census Bureau, State and County Quickfacts, Coos County, Oregon. Available at: http://quickfacts.census.gov/qfd/states/41/41061.html

nor retard the long-term progress of impaired habitats toward proper functioning condition essential to the long-term survival and recovery at the population or ESU scale.

2.1.8 Reinitiation of Consultation

As provided in 50 CFR 402.16, reinitiation of formal consultation is required if: (1) The amount or extent of taking specified in the incidental take statement is exceeded, or is likely to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect on listed species that was not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease, pending conclusion of the reinitiated consultation.

2.2 Incidental Take Statement

The ESA at section 9 [16 USC 1538] prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule [50 CFR 223.203]. Take is defined by the statute as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" [16 USC 1532(19)]. Harm is defined by regulation as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering" [50 CFR 222.102]. Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering" [50 CFR 17.3]. Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant" [50 CFR 402.02]. The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement [16 USC 1536].

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

2.2.1 Amount or Extent of the Take

The proposed action is reasonably certain to result in incidental take of juvenile SR steelhead and SR chinook salmon. NOAA Fisheries is reasonably certain the incidental take described here will occur because: (1) The listed species are known to occur in the action area; and (2) the proposed action is likely to cause adverse effects that are significant enough to cause death or injury, or impair feeding, breeding, migrating, or sheltering for the listed species.

Some level of incidental take is expected to result from injury or death of juvenile SR steelhead and adult SR spring/summer chinook salmon during instream work. The temporary increase in sediment and turbidity is expected to cause fish to avoid disturbed areas of the stream, both within and downstream of the Project area. Incidental take in the form of death or sublethal effects can occur if toxicants are introduced into the water. Incidental take in the form of harm is likely from riparian disturbance caused by the proposed Project. This incidental take will be reduced as newly-planted riparian vegetation is established and loose soil is stabilized.

Because of the inherent biological characteristics of aquatic species such as SR steelhead and SR spring/summer chinook salmon, the likelihood of discovering take attributable to this action is very limited. Take associated with the effects of actions such as these are largely unquantifiable in the short term, and may not be measurable as long-term effects on the species' habitat or population levels. Therefore, although NOAA Fisheries expects the habitat-related effects of these actions to cause some low level of incidental take, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a number of incidentally taken individuals because of those habitat-related effects. In instances such as these, NOAA Fisheries designates the expected level of take as "unquantifiable."

Incidental take in the form of capture and possible direct mortality is expected during the work isolation and fish salvage operation. Because of low flows and warm temperatures and current limited fish distribution within the Project area during the in-water work window, NOAA Fisheries expects very few fish to be present in the Project area during implementation. Because few fish are expected to be present, the fish salvage operation is expected to cause little direct mortality. The expected level of juvenile SR steelhead killed will not exceed five individual juvenile steelhead. The number of adult SR spring/summer chinook salmon killed will not exceed one individual.

This incidental take statement will also provide an exemption from the ESA take prohibition for any fish salvage that is required to rescue adult SR chinook salmon trapped below the Project area for two summers following project implementation. For these operations, the number of SR spring/summer adult chinook salmon killed will not exceed two individuals per year.

This exemption from the take prohibition includes only take caused by the proposed action as described in the BA and above, within the action area as defined in this Opinion.

2.2.2 Effect of Take

In this Opinion, NOAA Fisheries determines that this level of anticipated take is not likely to result in jeopardy to SR steelhead or SR spring/summer chinook.

2.2.3 Reasonable and Prudent Measures

NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to minimize the impact of incidental taking on the above species. The COE, in respect to their proposed or ongoing activities addressed in this Opinion, shall:

1. Avoid or minimize the amount and extent of take resulting from general construction activities, riparian disturbance, and in-water work required to complete the proposed Project addressed in this Opinion.

2. Avoid or minimize the likelihood of incidental take from contaminant leaks and spills associated with the use of heavy equipment into and within watercourses.

3. Minimize the amount and extent of incidental take resulting from fish salvage operations.

4. Avoid or minimize the amount of take of adult SR spring/summer chinook salmon in years following Project implementation by funding monitoring for stranded fish in and below the project area and funding a fish salvage operation if chinook salmon are observed stranded in or below the Project area.

5. Avoid or minimize the amount of take resulting from failures of Project elements by ensuring that funds are available to repair elements that may fail during high flows events following Project implementation.

6. Monitor the effects of the proposed action to determine the actual Project effects on listed fish (50 CFR 402.14 (I)(3)). Monitoring should detect adverse effects of the proposed action, assess the actual levels of incidental take in comparison with anticipated incidental take documented in this Opinion, and detect circumstances where the level of incidental take is exceeded.

2.2.4 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the action must be implemented in compliance with the following terms and conditions, which implement the reasonable and prudent measures described above for each category of activity. These terms and conditions are non-discretionary.

1. To implement reasonable and prudent measure #1 (general construction, riparian disturbance, and in-water work), the COE shall ensure that:

    a. Minimum area. Confine construction impacts to the minimum area necessary to complete the Project.

b. Timing of in-water work. Work below the bankfull elevation[7] will be completed using the most recent in-water work period (presently July 1 to October 31), as appropriate for the Project area, unless otherwise approved in writing by NOAA Fisheries.

c. Cessation of work. Cease Project operations under high flow conditions that may result in inundation of the Project area, except for efforts to avoid or minimize resource damage.

d. Preconstruction activity. Complete the following actions before significant[8] alteration of the Project area.

   i. Marking. Flag the boundaries of clearing limits associated with site access and construction to prevent ground disturbance of critical riparian vegetation, wetlands and other sensitive sites beyond the flagged boundary.

   ii. Emergency erosion controls. Ensure a supply of sediment control materials (*e.g.*, silt fence, straw bales[9]).

   iii. Temporary erosion controls. All temporary erosion controls will be in-place and appropriately installed downslope of Project activity within the riparian area until site restoration is complete.

   iv. General erosion control. Practices to prevent erosion and sedimentation associated with access roads, stream crossings, drilling sites, construction sites, borrow pit operations, haul roads, equipment and material storage sites, fueling operations, staging areas, and roads being decommissioned.

   v. Inspection of erosion controls. During construction, monitor instream turbidity and inspect all erosion controls daily during the rainy season and weekly during the dry season, or more often as necessary, to ensure the erosion controls are working adequately.[10]

      (1) If monitoring or inspection shows that the erosion controls are ineffective, mobilize work crews immediately to make repairs, install replacements, or install additional controls as necessary.

      (2) Remove sediment from erosion controls once it has reached 1/3 of the exposed height of the control.

e. Heavy Equipment. When heavy equipment will be used, the equipment selected will have the least adverse effects on the environment (*e.g.*, minimally-sized, low ground pressure equipment).

---

[7] 'Bankfull elevation' means the bank height inundated by a 1.5 to 2-year average recurrence interval and may be estimated by morphological features such average bank height, scour lines and vegetation limits.

[8] 'Significant' means an effect can be meaningfully measured, detected or evaluated.

[9] When available, certified weed-free straw or hay bales will be used to prevent introduction of noxious weeds.

[10] 'Working adequately' means that Project activities do not increase ambient stream turbidity by more than 10% above background 100 feet below the discharge, when measured relative to a control point immediately upstream of the turbidity causing activity.

f. Site preparation. Conserve native materials for site restoration.
   i. If possible, leave native materials where they are found.
   ii. If materials are moved, damaged or destroyed, replace them with a functional equivalent during site restoration.
   iii. Stockpile any large wood,[11] native vegetation, weed-free topsoil, and native channel material displaced by construction for use during site restoration.

g. Earthwork. Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible.
   i. Site stabilization. Stabilize all disturbed areas following any break in work unless construction will resume within four days.
   ii. Source of materials. Obtain boulders, rock, woody materials and other natural construction materials used for the Project outside the riparian area.

h. Pesticides. Take of ESA-listed species caused by any aspect of pesticide use is not included in the exemption to the ESA take prohibitions provided by this incidental take statement. Pesticide use must be evaluated in an individual consultation, although mechanical or other methods may be used to control weeds and unwanted vegetation.

i. Fertilizer. Do not apply surface fertilizer within 50 feet of any stream channel.

2. To implement reasonable and prudent measure #2 (pollution control), the COE shall ensure that:

   a. Pollution Control Plan. Prepare and carry out a pollution and erosion control plan to prevent pollution caused by surveying or construction operations. The plan must be available for inspection on request by NOAA Fisheries.
      i. Plan Contents. The pollution and erosion control plan will contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.
         (1) The name and address of the party(s) responsible for accomplishment of the pollution and erosion control plan.
         (2) Practices to confine, remove and dispose of excess concrete, cement, grout, and other mortars or bonding agents, including measures for washout facilities.
         (3) A description of any regulated or hazardous products or materials that will be used for the Project, including procedures for inventory, storage, handling, and monitoring.

[11] For purposes of this Opinion only, 'large wood' means a tree, log, or rootwad big enough to dissipate stream energy associated with high flows, capture bedload, stabilize streambanks, influence channel characteristics, and otherwise support aquatic habitat function, given the slope and bankfull channel width of the stream in which the wood occurs. See, Oregon Department of Forestry and Oregon Department of Fish and Wildlife, *A Guide to Placing Large Wood in Streams*, May 1995 (www.odf.state.or.us/FP/RefLibrary/LargeWoodPlacemntGuide5-95.doc).

(4) A spill containment and control plan with notification procedures, specific cleanup and disposal instructions for different products, quick response containment and cleanup measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

(5) Practices to prevent construction debris from dropping into any stream or waterbody, and to remove any material that does drop with a minimum disturbance to the streambed and water quality.

ii. Vehicle and material staging. Store construction materials and fuel, operate, maintain, and store vehicles as follows.

(1) To reduce the staging area and potential for contamination, ensure that only enough supplies and equipment to complete a specific job will be stored on site.

(2) Complete vehicle staging, cleaning, maintenance, refueling, and fuel storage in a vehicle staging area placed outside of any riparian areas, unless otherwise approved in writing by NOAA Fisheries.

(3) Inspect all vehicles operated within an riparian areas daily for fluid leaks before leaving the vehicle staging area. Repair any leaks detected in the vehicle staging area before the vehicle resumes operation. Document inspections in a record that is available for review on request by NOAA Fisheries.

(4) Before operations begin and as often as necessary during operation, steam clean all equipment that will be used below bankfull elevation until all visible external oil, grease, mud, and other visible contaminates are removed.

(5) Diaper all stationary power equipment (*e.g.*, generators, cranes, stationary drilling equipment) operated within any riparian area to prevent leaks, unless suitable containment is provided to prevent potential spills from entering any stream or waterbody.

b. Floating Boom. An oil-absorbing, floating boom whenever surface water is present.

c. Construction discharge water. Treat all discharge water created by construction (*e.g.*, concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) as follows.

i. Water quality. Design, build and maintain facilities to collect and treat all construction discharge water using the best available technology applicable to site conditions. Provide treatment to remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present.

ii. Discharge velocity. If construction discharge water is released using an outfall or diffuser port, velocities may not exceed 4 feet per second, and the maximum size of any aperture may not exceed one inch.

iii. Pollutants. Do not allow pollutants including green concrete, contaminated water, silt, welding slag, sandblasting abrasive, or grout cured less than 24 hours to contact any wetland or the two-year floodplain.

3. To implement reasonable and prudent measure #3 (fish salvage), the COE shall ensure that:

a. Fish screens. Have a fish screen installed, operated and maintained according to NOAA Fisheries' fish screen criteria[12] on each water intake used for Project construction, including pumps used to isolate an in-water work area. Screens for water diversions or intakes that will be used for irrigation, municipal or industrial purposes, or any use besides Project construction are not authorized.

b. Capture and release. Use the following Protocols during fish slavage:

i. Fish Handling and Transfer Protocols – Fish Capture Alternatives . Where the capture, removal, and relocation of ESA-listed fish are required, the COE shall:

(1) Have a fisheries biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish conduct or supervise the operation

(2) Use one or combination of the following methods to most effectively capture ESA-listed fish and minimize harm.

(a) Hand Netting. Collect fish by hand or dip nets, as the area is slowly dewatered.

(b) Seining. Seine using a net with mesh of such a size as to ensure entrapment of the residing ESA-listed fish.

(c) Minnow Trap. Place minnow traps overnight and in conjunction with seining.

(3) Fish Storage and Release. Where the capture, removal, and relocation of ESA-listed fish are required the COE shall:

(a) Handle captured fish with extreme care and keep these fish in water to the maximum extent possible for the least amount of time during transfer procedures. The use of a sanctuary net is recommended.[13]

(b) Utilize large buckets (5-gallon or greater) and minimize the number of fish stored in each bucket to prevent overcrowding.

---

[12] National Marine Fisheries Service, *Juvenile Fish Screen Criteria* (revised February 16, 1995) and *Addendum: Juvenile Fish Screen Criteria for Pump Intakes* (May 9, 1996) (guidelines and criteria for migrant fish passage facilities, and new pump intakes and existing inadequate pump intake screens) (http://www.nwr.noaa.gov/1hydrop/hydroweb/ferc.htm).

[13] A sanctuary net is a net that has a solid bottom bag that allows for the retention of a small amount of water in the net, thus allowing for less potential impact to netted fish from the net mesh.

(c) Place large fish in buckets separate from smaller, prey-sized fish.
(d) Monitor water temperature in buckets and well-being of captured fish.
(e) Release fish upstream of the isolated reach in a pool or area that provides cover and flow refuge after fish have recovered from stress of capture.
(f) Document all fish injuries or mortalities.

(4) Electroshocking. If electroshockers are used follow NOAA Fisheries guidelines for electroshocking (Appendix A)

4. To implement reasonable and prudent measure #4 (fish salvage to rescue stranded fish), the COE shall ensure that:

a. Funding for monitoring. The ODFW, Confederated Tribes of the Umatilla Indian Reservation, or another suitable contractor are provided with funds for monitoring, on a daily basis, for fish stranded in or below the Project area. The starting time for monitoring will be determined by NOAA Fisheries and ODFW, and will based on yearly chinook run timing and streamflows in the Grande Ronde River.

b. Funding for fish salvage. The ODFW, Confederated Tribes of the Umatilla Indian Reservation, or another suitable contractor are provided with funds for conducting fish salvage if SR spring/summer chinook salmon are discovered stranded in or below the action area. The fish salvage will be carried out in accordance with Term and Condition #3, above.

5. To implement reasonable and prudent measure #5 (repair of damaged Project elements), the COE shall ensure that continuing construction funds or contingency funds are reserved in the Project budget for at least two years to fund the cost of repairing Project elements that may fail in high flow events following implementation. The COE shall meet with NOAA Fisheries prior to turning over the Project to the local sponsor.

6. To implement reasonable and prudent measure #6 (monitoring), the COE shall:

a. Reporting. Within one year of Project completion and for five years thereafter, the COE will submit a monitoring report to NOAA Fisheries describing the COE's success in meeting the terms and conditions contained in this Opinion. The monitoring report will include the following information.

i. Project identification

(1) Project name.
(2) COE contact person.
(3) Starting and ending dates for work completed.

ii. Photo documentation. Photos of habitat conditions at the Project and any compensation site(s), before, during, and after Project completion.[14]
   (1) Include general views and close-ups showing details of the Project and Project area, including pre and post construction.
   (2) Label each photo with date, time, Project name, photographer's name, and a comment about the subject.

iii. Other data. Additional Project-specific data, as appropriate.
   (1) Work cessation. Dates work ceased due to high flows, if any.
   (2) Fish screen. Evidence of compliance with NOAA Fisheries' fish screen criteria.
   (3) Pollution control. A summary of pollution and erosion control inspections, including any erosion control failure, contaminant release, and correction effort.
   (4) Site preparation.
      (a) Total cleared area – riparian and upland.
      (b) Total new impervious area.
   (5) Isolation of in-water work area, capture and release.
      (a) Supervisory fish biologist – name and address.
      (b) Methods of work area isolation and take minimization.
      (c) Stream conditions before, during and within one week after completion of work area isolation.
      (d) Means of fish capture.
      (e) Number of SR steelhead and SR spring/summer chinook salmon captured.
      (f) Location and condition of all fish released.
      (g) Any incidence of observed injury or mortality of listed species.
   (6) Fish stranding. The number of fish observed stranded in or below the Project area and any mortality that occurred due to salvage efforts to relocate these fish.
   (7) Fish passage. An assessment of the ability of fish to pass through the Project area during various stream flow conditions.
   (8) Site restoration. Photo or other documentation that site restoration plan proposed as part of the Project is met.

b. Physical Channel Alteration. Provide information, including photographs, summarizing the effectiveness of the Project design in meeting the Project goals. If any Projects elements fail, provide information on the effects of this failure to salmonid habitat and stream channel morphology.

[14] Relevant habitat conditions may include characteristics of channels, eroding and stable streambanks in the Project area, riparian vegetation, water quality, flows at base, bankfull and over-bankfull stages, and other visually discernable environmental conditions at the Project area, and upstream and downstream of the Project.

c. Effectiveness monitoring. Gather any other data or analyses the COE deems necessary or helpful to complete an assessment of habitat trends in stream and riparian conditions as a result of this Project.

d. Lethal take. If a sick, injured, or dead specimen of a threatened or endangered species is found, the finder must notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at (360) 418-4246. The finder must take care in handling sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

e. Report submission. Submit a copy of the report to the Oregon State Habitat Office of NOAA Fisheries.

Director, Oregon State Habitat Office
Habitat Conservation Division
National Marine Fisheries Service
Attn: 2002/00692
525 NE Oregon Street
Portland, OR 97232

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires the inclusion of EFH descriptions in Federal fishery management plans. In addition, the MSA requires Federal agencies to consult with NOAA Fisheries on activities that would adversely affect EFH.

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting the definition of EFH: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.110).

Section 305(b) of the MSA (16 U.S.C. 1855(b)) requires that:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH;

- NOAA Fisheries shall provide conservation recommendations for any Federal or state Activity that may adversely affect EFH;

- Federal agencies shall within 30 days after receiving conservation recommendations from NOAA Fisheries provide a detailed response in writing to NOAA Fisheries regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NOAA Fisheries, the Federal agency shall explain its reason for not following the recommendations.

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by Federal agencies undertaking, permitting or funding activities that may adversely affect EFH, regardless of its location.

3.2 Identification of EFH

The Pacific Fisheries Management Council (PFMC) has designated EFH for three species of Pacific salmon: Chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O.gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other waterbodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (*e.g.*, natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the *Pacific Coast Salmon Plan* (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based on this information.

3.3 Proposed Actions

The proposed action is detailed above in section 1.2 of the ESA portion of this Opinion. The action area includes watersheds within the Upper Grande Ronde River subbasin. This area has been designated as EFH for various life stages of chinook and coho salmon.

3.4 Effects of Proposed Action

The effects on chinook and coho salmon habitat are the same as those for SR steelhead and SR spring/summer chinook and are described in detail in section 2.2.1 of this document, the

proposed action may result in short-term adverse effects on a variety of habitat parameters. These adverse effects are:

1. Riparian disturbance from accessing construction area and construction activities performed from the bank.

2. Increased sedimentation from instream construction activities.

3. Potential blockage of fish passage during Project implementation and potentially during low flows for up to two years following Project implementation.

3.5 Conclusion

NOAA Fisheries believes that the proposed action will adversely affect EFH for chinook salmon and coho salmon.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations for any Federal or state agency action that may adversely affect EFH. In addition to conservation measures proposed for the project by the COE, all of the reasonable and prudent measures and the terms and conditions contained in sections 2.2.3 and 2.2.4 (respectively) of the ESA portion of this Opinion are applicable to salmon EFH. Therefore, NOAA Fisheries incorporates each of those measures here as EFH conservation recommendations.

3.7 Statutory Response Requirement

The MSA (section 305(b)) and 50 CFR 600.920(j) requires the COE to provide a written response to NOAA Fisheries' EFH conservation recommendations within 30 days of its receipt of this letter. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. If the response is inconsistent with NOAA Fisheries' conservation recommendations, the COE shall explain its reasons for not following the recommendations.

3.8 Supplemental Consultation

The COE must reinitiate EFH consultation with NOAA Fisheries if either the action is substantially revised or new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920).

4. LITERATURE CITED

Bell, M.C. 1991. Fisheries handbook of Engineering requirements and biological criteria. Fish Passage Development and Evaluation Program. U.S. Army COE of Engineers. North Pacific Division.

Berg, L. and T.G. Northcote. 1985. "Changes In Territorial, Gill-Flaring, and Feeding Behavior in Juvenile Coho Salmon (*Oncorhynchus kisutch*) Following Short-Term Pulses of Suspended Sediment." Canadian Journal of Fisheries and Aquatic Sciences 42:1410-1417.

Birtwell, I. K., G. F. Hartman, B. Anderson, D. J. McLeay and J. G. Malick. 1984. A brief investigation of Arctic Grayling (*Thymallus arcticus*) and aquatic invertebrates in the Minto Creek drainage, Mayo, Yukon Territory: an area subjected to placer mining. Canadian Technical Report of Fisheries and Aquatic Sciences 1287.

Bjorn, T.C., and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages 83-138, in W.R. Meehan (editor) Influences of forest and rangeland management on salmonid fishes and their habitats. Special Publication 19. American Fisheries Society, Bethesda, Maryland.

Busby, P., T. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, and I.V. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon, and California.

Coutant, C.C. 1999. Perspectives on Temperature in the Pacific Northwest's Fresh Waters. Environmental Sciences Division Publication 4849 (ORNL/TM-1999/44), Oak Ridge National Laboratory, Oak Ridge, Tennessee. 108 p.

DeVore, P. W., L. T. Brooke and W. A. Swenson. 1980. The effects of red clay turbidity and sedimentation on aquatic life in the Nemadji River system. Impact of nonpoint pollution control on western Lake Superior. S. C. Andrews, R. G. Christensen, and C. D. Wilson. Washington, D.C., U.S. Environmental Protection Agency. EPA Report 905/9-79-002-B.

Federal Caucus. 2000. Conservation of Columbia Basin Fish: Final Basinwide Salmon Recovery Strategy. <http://www.salmonrecovery.gov> December.

Gregory, R.S. 1993. Effect of turbidity on the predator avoidance behavior of juvenile chinook salmon (*Oncorhynchus tshawytscha*). Canadian J. Fish. Aquatic Sciences 50:241-246.

Gregory, R.S., and C.D. Levings. 1998. Turbidity reduces predation on migrating juvenile pacific salmon. Transactions of the American Fisheries Society 127: 275-285.

Henjum, M.G., J.R. Karr, D.L. Bottom, D.A. Perry, J.C. Bednarz, S.G. Wright, S.A. Beckwitt and E. Beckwitt. 1994. Interim Protection for Late-successional Forests, Fisheries and Watersheds. National Forests East of the Cascade Crest, Oregon and Washington. A Report to the United States Congress and the President. The Wildlife Society, Bethesda, MD.

House, R.A. and P.L. Boehne. 1986. Effects of instream structures on salmonid habitat and populations in Tobe Creek, Oregon. North American Journal of Fisheries Management. 6(1): 38-46.

Independent Scientific Group. 1996. Return to the River: Restoration of Salmonid Fishes in the Columbia River Ecosystem. Northwest Power Planning Council. Portland, Oregon. 500 p.

Keniry, P. 2003. Memorandum on 2003 Spawning ground survey results. Oregon Department of Fish and Wildlife. La Grande, OR. November 13. 7p.

Lee, D. C., J. R. Sedell, B. E. Rieman, R. F. Thurow, and J. E. Williams. 1997. Broadscale Assessment of Aquatic Species and Habitats. Volume III, Chapter 4. U.S. For. Serv., Gen. Tech. Rep. PNW-GTR-405. Portland, Oregon.

Lloyd, D.S. 1987. Turbidity as a water quality standard for habitats in Alaska. North American Journal of Fisheries Management 7:34-35.

Lloyd, D. S., J. P. Koenings, and J. D. LaPerriere. 1987. Effects of turbidity in fresh waters of Alaska. North American Journal of Fisheries Management 7: 18-33.

Maser, Chris & James R. Sedell. 1994. From the Forest to the Sea: The Ecology of Wood in Streams, Rivers, Estuaries, and Oceans. St. Lucie Press, Delray Beach, Florida.

McElhany, P., M. Ruckleshaus, M. J. Ford, T. Wainwright, and E. Bjorkstedt. 2000. Viable Salmon Populations and the Recovery of Evolutionarily Significant Units. U. S. Dept. Commer., NOAA Technical Memorandum NMFS-NWFSC-42.

McIntosh, B.A., J.R. Sedell, J.E. Smith, R.C. Wissmar, S.E. Clarke, G.H. Reeves, and L.A. Brown. 1994. Management History of Eastside Ecosystems: Changes in Fish Habitat Over 50 Years, 1935 to 1992. USDA Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-321. February.

McLeay, D. J., G. L. Ennis, I. K. Birtwell, and G. F. Hartman. 1984. Effects On Arctic Grayling (*Thymallus arcticus*) of Prolonged Exposure to Yukon Placer Mining Sediment: A Laboratory Study. Canadian Technical Report of Fisheries and Aquatic Sciences 1241.

McLeay, D. J., I. K. Birtwell, G. F. Hartman, and G. L. Ennis. 1987. Responses of Arctic Grayling (*Thymallus arcticus*) To Acute and Prolonged Exposure to Yukon Placer Mining Sediment. Canadian Journal of Fisheries and Aquatic Sciences 44: 658-673

National Research Council. 1996. Upstream—Salmon and Society in the Pacific Northwest. National Academy Press, Washington, D.C.

Neff, J.M. 1985. Polycyclic aromatic hydrocarbons. *In*: Fundamentals of aquatic toxicology, G.M. Rand and S.R. Petrocelli, pp. 416-454. Hemisphere Publishing, Washington, D.C.

Newcombe, C. P., and D. D. MacDonald. 1991. Effects of Suspended Sediments on Aquatic Ecosystems." North American Journal of Fisheries Management 11: 72-82.

NOAA Fisheries 1996. Making Endangered Species Act Determinations of Effect for Individual and Grouped Actions at the Watershed Scale. Habitat Conservation Program, Portland, Oregon.

NOAA Fisheries (National Marine Fisheries Service) 1996b. Factors for decline: A supplement to the notice of determination for West Coast Steelhead under the Endangered Species Act. NOAA Fisheries, Protected Species Branch, Portland, Oregon, 83p. (Available from NOAA Fisheries Protected Resources Division, 525 N.E. Oregon Street, Portland, Oregon 97232).

NOAA Fisheries 1999. The Habitat Approach. Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids. Northwest Region, Habitat Conservation and Protected Resources Divisions, August 26.

NOAA Fisheries 1999b. Updated Review of the Status of the Upper Willamette River and Middle Columbia River ESUs of Steelhead (*Oncorhynchus mykiss*). January. 44 p. (Available @ www.nwr.noaa.gov under Protected Resources Division, Status Reviews).

NOAA Fisheries 2000. Biological Opinion -- Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin. Hydro Program, Portland, Oregon. (Issued December 21, 2000)

NOAA Fisheries (*in review*). 2003. Preliminary conclusions regarding the updated status of listed ESUs of West Coast salmon and steelhead. 142 pages. February. NOAA Fisheries, 525 NE Oregon Street, Suite 500, Portland, Oregon 97232-2737. (Available @ www.nwfsc.noaa.gov/)

Oregon Department of Fish and Wildlife (ODFW). 2000. Guidelines for Timing of Inwater Work to Protect Fish and Wildlife Resources, 12 pp. June 2000.

Oregon Progress Board. 2000. Oregon State of the Environment Report 2000. Oregon Progress Board, Salem, Oregon.

PFMC 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon. Pacific Fishery Management Council, Portland, Oregon.

Redding, J. M., C. B. Schreck, and F. H. Everest. 1987. Physiological Effects on Coho Salmon and Steelhead of Exposure to Suspended Solids. Transactions of the American Fisheries Society 116: 737-744.

Rhodes, J.J., D.A. McCullough, and F.A. Espinosa, Jr. 1994. A Coarse Screening Process for Potential Application in ESA Consultations. Columbia River Intertribal Fish Commission. Prepared under NOAA Fisheries/BIA Inter-Agency Agreement 40ABNF3. December.

Roper, B.B. D. Konnoff, D. Heller, and Ken Weiman. 1998. Durability of Pacific Northwest Instream Structures Following Floods. North American Journal of Fisheries Management 18: 686-693.

Scannell, P.O. 1988. Effects of elevated sediment levels from placer mining on survival and behavior of immature arctic grayling. Alaska Cooperative Fishery Unit, University of Alaska. Unit Contribution 27.

Sedell, J.R. and J.L. Froggatt. 1984. Importance of Streamside Forests to Large Rivers: The Isolation of theWillamette River, Oregon, USA, from Its Floodplain by Snagging and Streamside Forest Removal. Internationale Vereinigung fur theoretische und angewandte Limnologie Verhandlungen 22:1828-1834.

Servizi, J. A. and Martens, D. W. 1991. Effects of temperature, season, and fish size on acute lethality of suspended sediments to coho salmon. Canadian Journal of Fisheries and Aquatic Sciences 48:493:497.

Sigler , J. W., T.C. Bjorn and F.H. Everest. 1984. Effects of chronic turbidity on density and growth of steelheads and coho salmon. Trans. Am. Fish. Soc. 111:63-69.

Spence, B.C, G.A. Lomnicky, R.M. Hughes, R.P. Novitzki. 1996. An Ecosystem Approach to Salmonid Conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, OR.

US Forest Service. 2004. Biological Assessment for the Upper Grande Ronde River Assessment Area. La Grande, OR. 144pp. January 2004.

Wedemeyer, G.A., B.A. Barton, and D.J. McLeay. 1990. Stress and acclimation. Pages 451-490 *in* C.B. Schreck and P.B. Moyle, editors. Methods for fish biology. American Fisheries Society, Bethesda, Maryland.

Whitman, R.P., T.P. Quinn and E.L. Brannon. 1982. Influence of suspended volcanic ash on homing behavior of adult chinook salmon. Trans. Am. Fish. Soc. 113:142-150.

Wissmar, R.C., J.E. Smith, B.A. McIntosh, H.W. Li, G.H. Reeves, and J.R. Sedell. 1994. Ecological Health of River Basins in Forested Regions of Eastern Washington and Oregon. Gen. Tech. Rep. PNW-GTR-326. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Portland, OR. 65 p.